The Sunrise Project:

An NII Prototype

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Vision for a 21st Century Information Infrastructure*

- The information infrastructure can be divided into four interdependent parts:
  - a set of widely accessible and interoperable communications networks;
  - digital libraries, information databases and services;
  - easy to use information appliances and computer systems;
  - and trained people who can build, operate and maintain these resources.
- What is important is the ability to assemble all the necessary technical elements on demand to satisfy market needs

*Council on Competitiveness, May 1993

Rationale for IITA at Los Alamos

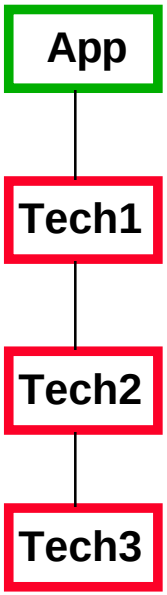
- Build on existing HPCC capability for National Information Infrastructure Technology and Applications (IITA) for the Laboratory and the Dept of Energy.
- Develop advanced environment to enhance competitiveness of lab technical programs.
- High Performance Computing applications are an important driver for information. technologies: GRACCE → NII
  - large datasets are good prototype for future data by consumers
- Necessary vehicle for bringing results of HPCC program to the nation.

Approach

- Combine the primary set of enabling technologies with a modest set of applications.
- Prove that modern information technologies can actually assist in significant application areas.
- Provide common solutions by recognizing overlapping requirements of these applications.
- Make High Performance Computing Initiative results more generally available.

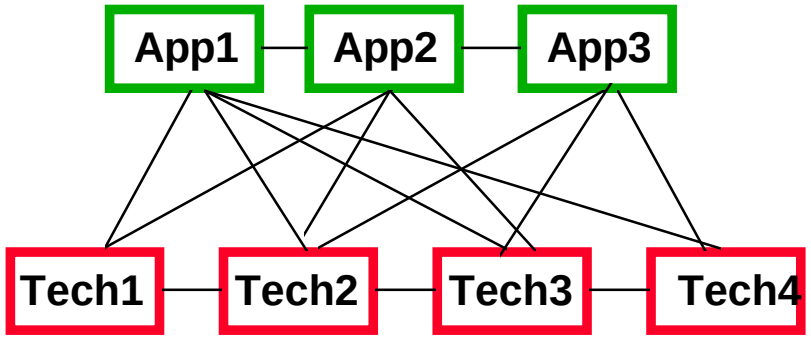
Approach

Vertical Integration



- Efficient for given domain
- Not always scalable

Horizontal Integration



- Common tools identifed
- Infrastructure clearly delineated
- Scalable solutions

Characteristics of Sunrise

- **Heterogeneous:**
  - Variety of software and hardware components to solution
- **Institutionally-Integrated:**
  - Cut across a range of application areas
  - Link together different research groups in laboratory
- **Intelligent:**
  - Providing secure, intuitive, understandable interfaces to valuable data sets
- **Information Infrastructure:**
  - Provide communication networks and software connectivity in an interoperable fashion

Enabling Technologies

- Distributed Object Computing
- Data Fusion, Visualization
- ATM Networking
- Digital Video Service
- Data and Systems Security
- Data Mining Technology

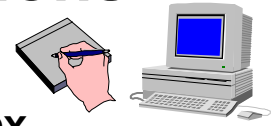
Embedded Applications

- Materials Modeling
- Intelligent Vehicle Highway Systems
- Medical Applications
- Financial Applications
- Electronic Publications
- Education

LANL Sunrise Project and Collaborations

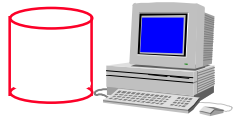
LANL/ACL
- Publish Global Ocean Model
- Teleradiology analysis
- Virtual collocation
- Data browsing
- Visualization

National Jewish Hospital
Denver, CO
- Teleradiology

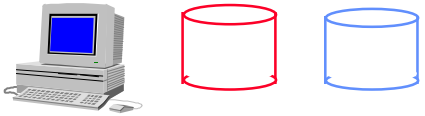


Xerox
- Multilevel simulation
- Virtual collocation
- Organizational memory
- Data browsing

ATM
Technet
Internet



Bank
- Financial Data



LANL/Materials Lab
- Materials Database publishing
- Data browsing
- Virtual collocation

Los Alamos High
Onate High
- Virtual collocation
- Data browsing
- Visualization

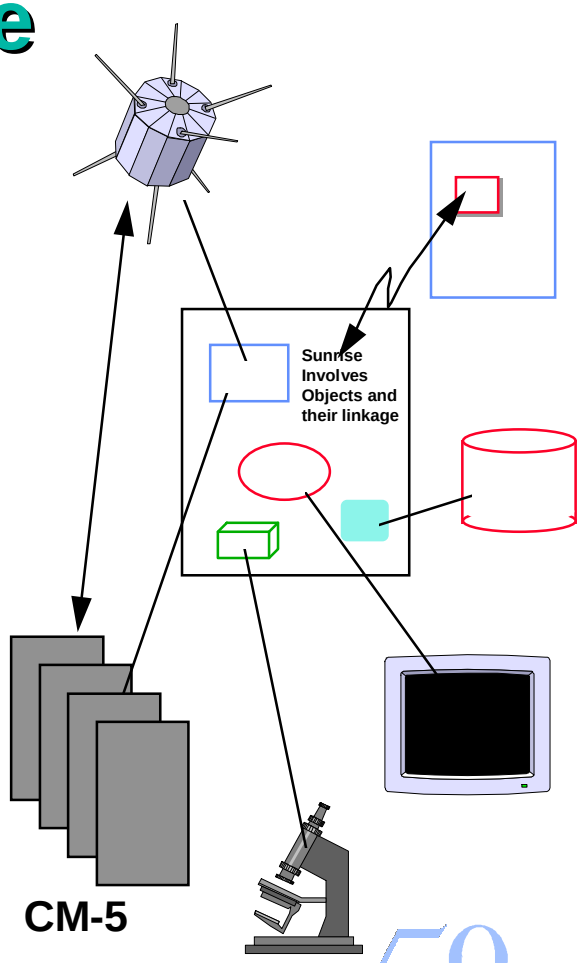
LANL/Computing Research
- Teleradiology
- Image Feature extraction

LANL/Statistical Assessment
- Publish IVHS simulations
- Virtual collocation
- Data browsing

LANL/Network Engineering
- Video server

Infrastructure

- Distributed Object System
  - Dynamic, hierarchical, desktop acess
- Document interface (OpenDoc)
  - Nested , potentially remote, objects
  - Extensible
  - Heterogeneous platform support
  - Can link to scientific application
- Multimedia support
- Security for each object
- ATM network



Technology Reuse

- **Image Browsing tools**
  - Feature extraction works for materials, medical images, financial data, transportation networks
  - Extension of feature extraction to other domains
- **Standardized base objects**
  - Common elements such as abstracts, image, embeddability
- **Navigation tools**
  - Location finding, object name resolution, network display
  - Merge/purge to cull unneeded data (good for finance)
- **Digital video might be computer output or instrument output**
  - Data fusion combines different types of data

Rationale and Benefits

- Builds on existing strengths of Laboratory in both computational science and in applied technologies.
- Combines these in an interdisciplinary manner to expose and build on commonalities (which actually compose the infrastructure).
- Will enable the Lab to be more competitive with intelligent use of information technologies in areas of strategic importance.
- Will provide a foundation to assist nation and apply to other areas (such as oil and gas).
- Industrial use of high performance distributed objects.